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(54) Building and installing offshore gravity platforms

(57) A method for construction and installation of a gravity platform (1) which is in entirety being constructed on at least one floating construction and ballastable barge or the like (7). Subsequent to that the platform (1) is ready-built in one or several parts, it is in separate parts lifted off from the construction barge or barges by means of one or more cranes (8) and is emersed for assembly in correct site on the sea bottom by ballasting one barge to a water level (9) substantially level with the top edge of at least one bottom section and pumping air into the bottom sections to reduce the effective weight of the platform.

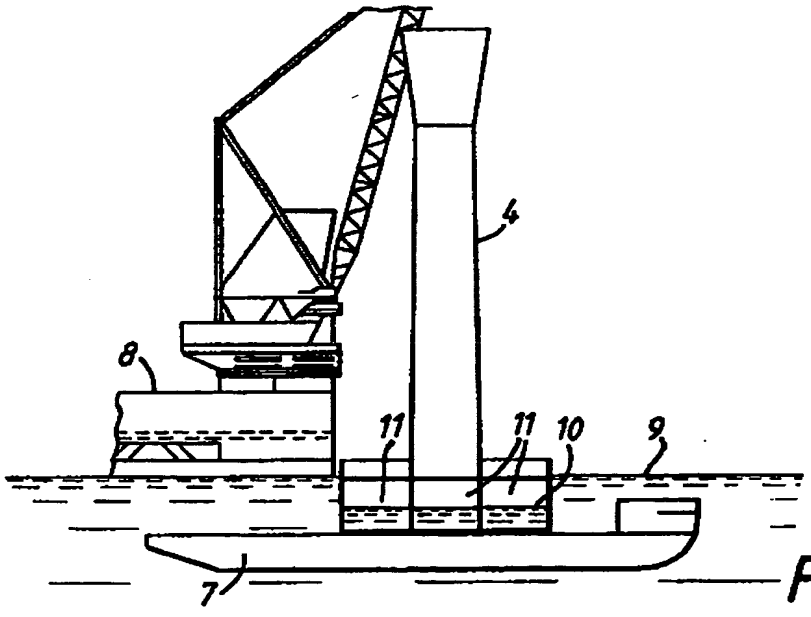

Fig.4.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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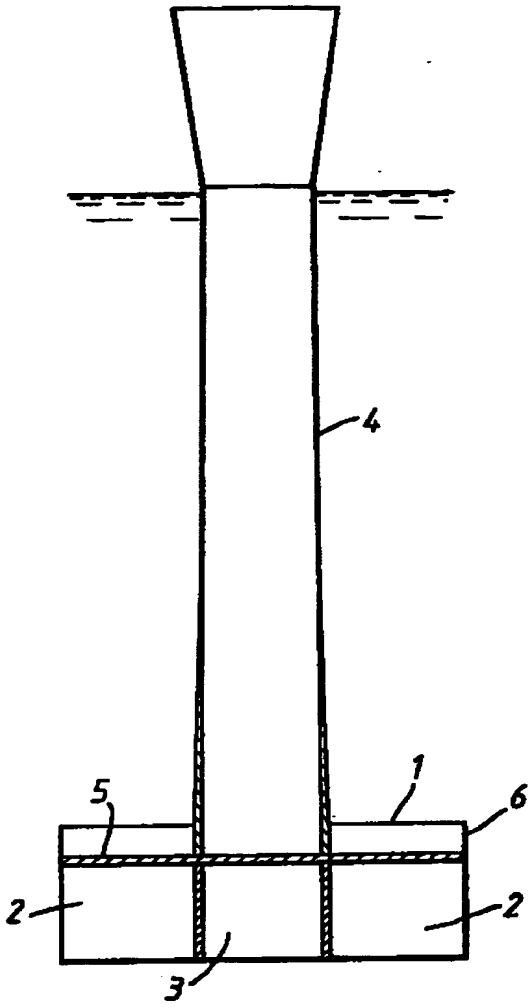

Fig.1a.

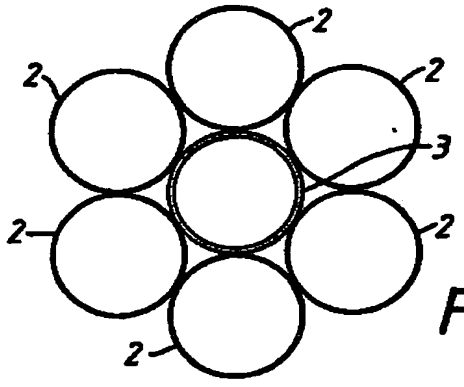

Fig.1b.

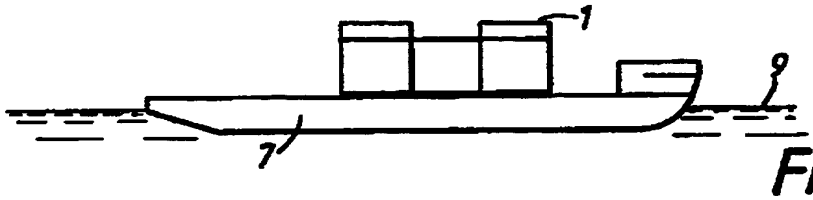

Fig.2.

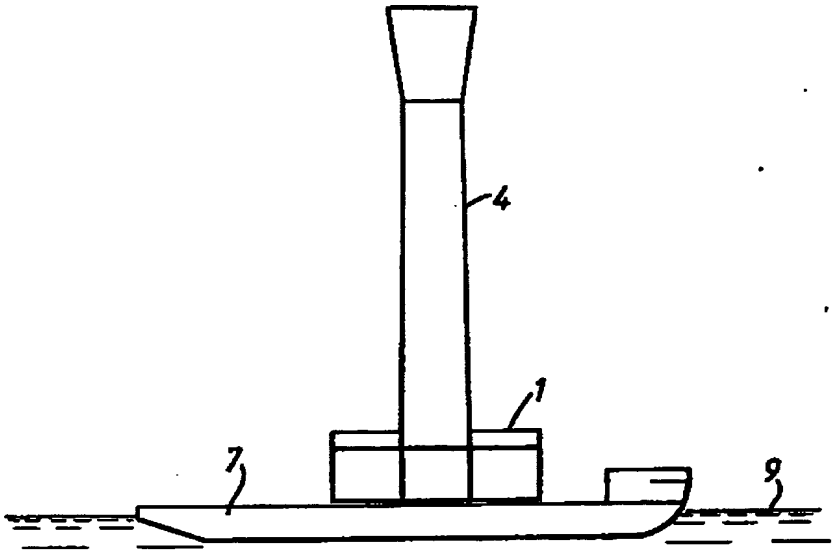

Fig.3.

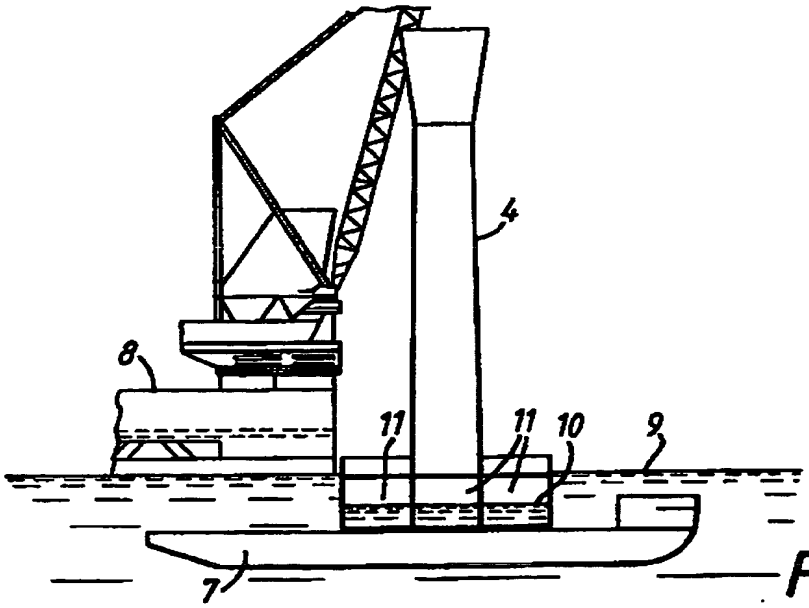

Fig.4.

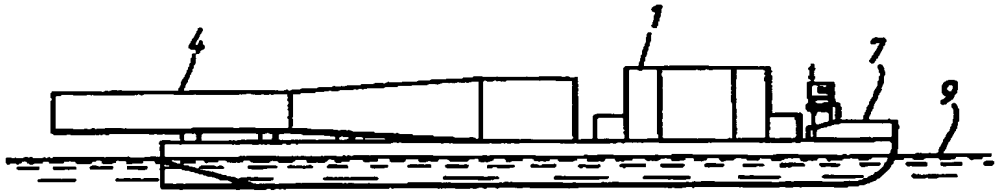

Fig.5.

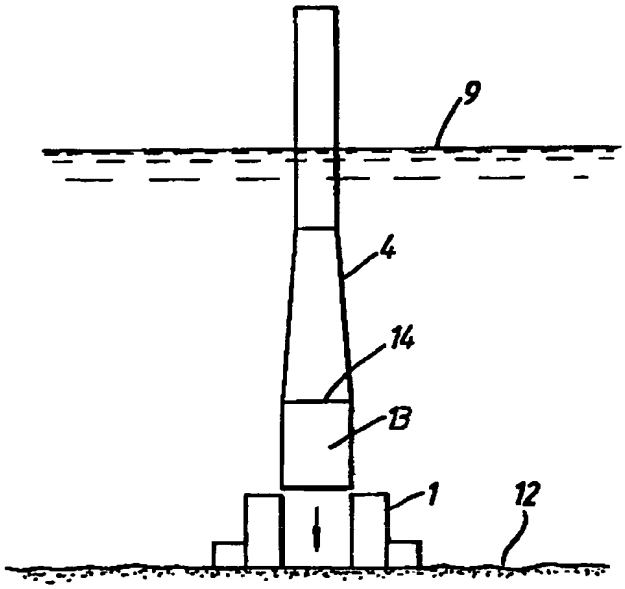

Fig.6.

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Title: METHOD FOR CONSTRUCTION OF OFFSHORE GRAVITY PLATFORMS AND INSTALLATION OF SUCH ON A SEA BOTTOM BY MEANS OF CRANES.

This invention relates in general to offshore gravity platforms, (GBS), preferably, but not exclusively made of concrete, and used in connection with drilling and exploration for hydro carbons in reservoirs in the sea bottom.

More particularly the invention relates to methods for building and installation of gravity platforms designed primarily for smaller depths, for instance depths of 25 to 100 meters. More particularly, the invention relates to the use of cranes in connection with building and installation of such platforms.

Conventional gravity platforms are being built such that they are self floating. The usual method is that the fundament section is firstly built in a dry dock or on a barge, whereafter the remaining operations are being carried out with the platform in floating condition, preferably in shielded waters, whereafter the ready made platform in upright floating position is being towed to the installation site, where it is emerged by ballasting.

The situation necessitating that such gravity platforms must be constructed self floating involves among other things that they must be equipped with special and cost adding ballasting possibilities which are necessary during the production, towing to the installation site, and under the installation work, but which are not required for the functioning of the platform as such.

The object of the present invention is to provide a method for making a gravity platform in its entirety on a construction barge without necessitating to furnish supplementary ballasting possibilities which are not adhered to the actual operational function of the gravity platform, but merely is due to the requirement that the platform must be self floating during the building and during the installation work.

The present invention therefore takes the aim to provide

a substantial gain in the form of reduced complexity, dimensions and weight compared with conventional technique.

The utilization of the method in accordance with the present invention is clearly limited to available barge- and crane capacities.

Particularly the available crane capacities will stipulate a practical upper limit for the realization of the method.

Todays commercially available cranes for such operations lift maximum 7000 tons, in other words, two cranes and suitable construction barge will define an upper practical limit for using a such method to about 14000 tons.

The main object of the present invention is thus to provide methods for construction and installation of smaller gravity platforms with use of building barges as before mentioned. A special object of the invention is to provide a method such that the platform weight may supersede available crane capacity without need for building of supplementary ballasting capacity. The latter embodiment for using the method for construction and installation is characterized in that the construction barge, or barges, subsequent to that the. gravity platform is being ready built on the building barge or barges, are being ballasted to a water line level substantially flush with the draft at the top edge of the bottom section of the gravity platform, the elements on the bottom sections are, if needed, being filled with air in order to reduce the effective weight of the gravity platform, whereafter the gravity platform or sections of the same are being lifted free off the construction barge and are being emerged down to the correct location on the sea bottom.

An optimalization of the applicability of the invention is realized if the gravity platform is being built in several sections on one or more construction barges. For instance a fundament section and a tower section, respectively, may be built separately and thereafter being emerged down and thereafter being assembled on the sea bottom.

The invention shall in the following be described and illustrated with reference to the accompanying drawings, wherein:

Figures 1a and 1b are showing a simple gravity platform in concrete shown in a vertical and a horizontal section, respectively,

Figure 2 is showing a construction barge where the work in connection with the casting of the gravity platform has been initiated,

Figure 3 is showing the gravity platform when the same is finished,

Figure 4 is showing a crane on a separate crane barge ready to lift the gravity platform free off the construction barge,

Figure 5 is showing a preferred transport method for the platform from the production site and out to an installation site, and

Figure 6 is showing a bottom section and a tower section, respectively, which have been built separately on a construction barge and thereafter being joined together on the installation site in correct position on the sea bottom.

As it will appear from Figures 1a and 1b, the shown gravity platform is of the most simple type cast in concrete with a fundament section 1 built of a number of cylindric elements 2,2, and a centrally located cylindric element 3 which forms fundament for a tower section 4.

The said cylindrical elements 2,2 and 3 are divided by a tight horizontal plate member 5 which is confined within a wall 6 which points upwards from said member and forms space for ballast which is supplied subsequent to that the gravity platform has been positioned on the installation site.

The gravity platform is entirely built up on a construction barge 7, confer Figures 2 and 3, where the latter Figure is showing the platform when being ready-built.

When the platform has been ready-built and constructed, the construction barge including the gravity platform is being towed to the installation site together with a crane barge 7 equipped with a crane 8. Only one crane is shown, but if necessary, two or more cranes can be used jointly in order to lift the gravity platform clear off the deck of the construction

barge and thereafter being submerged down to the location on the sea bottom.

If, however, the weight of the gravity platform supersedes the lifting capacity of the crane or cranes, the construction barge 7 is being ballasted up to a water line level 9 in level with the plate 5 on the bottom section of the gravity platform. Air is being pumped into the cylindric elements 2,2, and 3 below the tight horizontal plate member 5, whereby air chambers are being formed rendering sufficient buoyancy such that the crane/cranes can lift the gravity platform free off the construction barge, and thereafter being submerged down to correct site on the sea bottom.

In Figure 4 is shown the air-filled section 11,11, of the chambers above the water surface level 10.

During the submersion operation the said chambers are being ballasted with water, and the installation is finalized in known fashion.

Figure 5 is illustrating an alternative method for transporting the platform from a production site to the installation site, whereby the tower section 4 as shown is arranged in horizontal position on the barge 7, either separate on the barge or as shown adjacent to the bottom section 1. This method for transportation is assumed preferable both from a cost view and from a matter of safety, especially in connection with somewhat larger and heavier platforms.

As mentioned above, the applicability of the invention may be further increased when for instance the bottom section and the tower section are being built separately on one or several construction barges. The bottom section which constitutes the heavier part, usually about 60% of the entire platform, is being lifted off the construction barge as described above, and when this is installed in correct site on the sea bottom the tower section is mounted on to the same, preferably as shown in Figure 6 which illustrates a bottom section 1 made in concrete and which is positioned on the sea bottom 12 and the tower section 4, likewise made in concrete, is submerged down into the opening or aperture in the bottom section and is being anchored to the same by means of injection cementing or the like.

If the weight of the tower section supersedes available crane capacity, the same method as used for the bottom section can also be used for the tower section, since the lower chamber 13 in the tower section which is closed at the top by means of a plate 14, can be used for lifting the tower section clear off the deck of the construction parts by means of supplied air in the same fashion as described in connection with the bottom section.

It shall be understood that the invention is not limited to sections of concrete, since it is likewise applicable for sections of steel or a mixture of the same, and adapted with joining methods in accordance with conventional techniques.

Patent Claims

1. Method for building and installation of a gravity platform, wherein the platform in its entirety is being built on one or more floating construction barges or the like, and whereby the gravity platform subsequent to being built is being lifted off the construction barge or barges by means of at least one crane and being lowered down to position on the sea bottom, and by which the normal weight of the gravity platform supersedes available crane capacity, the method including the following steps,
the construction barge or barges, subsequent to that the gravity platform is being built on the construction barge or barges,
at least one barge is ballasted to a water level substantially level with the top edge of at least one of the bottom sections of the gravity platform,
the elements of the bottom sections are being filled with air to reduce the effective weight of the gravity platform, in sufficient degree,
whereafter the gravity platform or sections of the same are being lifted free of the construction barge and are submerged and lowered down into place on the sea bottom.

2. Method in accordance with claim 2,
wherein the gravity platform is built in several mutual separate sections, preferably at least one bottom section and one tower section, and the bottom section is firstly lowered down into place on the sea bottom,
whereafter the tower section is lowered down and is integrated with the installed bottom section.

3. Method in accordance with claim 2 or 3,
wherein the construction barge subsequent to that the tower section is ready-built on the construction barge, is ballasted to a water line level on level with the top edge of a chamber in the lower part of the tower section, and said chamber is being filled with air in order to reduce the effective weight

of the tower section sufficiently so that the tower section can be lifted free off the deck of the construction barge.

4. Method for construction and installation of a gravity platform in accordance with any of preceding claims, wherein the bottom section and the tower section are produced separately on at least one barge, the tower section is transported to the installation site in laying, horizontal position, whereafter, subsequent to that the bottom section is submerged down in place on the sea bottom, the tower section by means of one or more cranes is being lifted up to vertical position and is emerged and lowered down into correct position on the bottom section in order to be integrated with the same.

5. Gravity platform, particularly designed for being installed with the method in accordance with claims 1 to 3, wherein a bottom section is provided with a central opening dimensioned and designed for reception of a complementary tower section.

6. Gravity platform in accordance with claim 5, wherein the inside space of the bottom section is divided into several chambers by means of horizontal walls.

7. Gravity platform in accordance with claim 5 or 6, wherein the central part of the bottom section includes the opening for positioning of the tower section, and which part has greater height than the outwardly positioned part of the bottom section.

8. Gravity platform in accordance with claims 5 to 7, wherein the tower section is hollow and is divided into two or several vertical separated chambers.

9. Gravity platform in accordance with any of preceding claims 5 to 8, wherein the bottom section comprises a number of integrally joined concentric cylindric elements in a ring structure including one bottom wall and one top wall, and the center part of the bottom section is provided with a through-going substantially ring-shaped opening or shaft.

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